

REMARKS/ARGUMENTS

Claims 1, 4, 6-10, 13, 15-19, 22 and 24-29 are now pending in the present application. Claims 4, 6, 13, 15, 22 and 24 are allowed.

By the present Amendment, independent claims 1, 10 and 19 have been amended; and new dependent claims 28 and 29 have been added. In addition, claims 2, 3, 5, 11, 12, 14, 20, 21 and 23 have been canceled to expedite prosecution. Applicants have carefully considered the cited art and the Examiner's comments, and believe the claims currently in the case patentably distinguish over the cited art and are allowable in their present form. Applicants, accordingly, believe that this application is now in condition for allowance; and respectfully request reconsideration of the rejection in view of the above amendments and the following comments.

I. 35 U.S.C. § 102, Anticipation

The Examiner has rejected claims 1-3, 5, 7-12, 14 and 16-18 under 35 U.S.C. § 102(e) as being anticipated by Skelly et al. (U.S. Patent No. 6,661,810). This rejection is respectfully traversed.

Initially, with respect to claim 1, the claim has been amended to incorporate subject matter previously recited in dependent claim 5, and claim 5 has been canceled. Applicants believe claim 1, as amended, is not disclosed or suggested by Skelly and patentably distinguishes over Skelly in its present form.

In rejecting claim 1 as being anticipated by Skelly, the Examiner states:

5. In re claim 1, Skelly discloses a method for removing the effect of clock skew between data processing systems [abstract; col. 3, l.62 ~ col. 4, l.13], comprising:
- Making delay measurements between two data processing systems [device 102s; sender and receiver] connected by a network [100] [fig. 1; col. 9, ll.1-6; col. 10, ll.29-39].
 - Forming a set of data points, wherein each data point in the set of data points comprises a time [t] and a delay measurement [d] for the respective time [fig. 4; col. 7, ll.7-20; col. 9, ll.6-12].
 - Finding convex hull [feasible region] of the set of data points, wherein the convex hull is bounded by a number of line segments [col. 9, ll.16-19; col. 10, ll.50-63; varying y-intercept and slope yields various lines bounding feasible region].

- Selecting a one of the line segments that optimizes an objective function [col. 9, ll. 19-24; col. 10, l.64 – col. 11, l.20].
- Extrapolating the one of the line segments to obtain an affine function [col.9, ll.24-26].
- Removing the effect of clock skew between the two data processing systems as characterized by the affine function [col. 2, ll.51-58, col. 13, l.65 – col. 19, l.40].

Final Office Action dated January 25, 2005, pages 2 and 3.

Further, in rejecting claim 5, the Examiner states:

8. As to claims 5 and 14, Skelly discloses that the one of the line segments is selected so that the area between a plot of a piece-wise linear function containing the set of data points [line skimming through bottom of mass of scatter plot] and a line containing the one of the line segments will be minimized [col. 10, l. 64 –col. 11, 20; col. 16, ll 54-67].

Final Office Action dated January 25, 2005, page 3.

Claim 1, as amended herein, is as follows:

1. A method for removing the effect of clock skew between data processing systems, comprising:

making delay measurements between two data processing systems connected by a network;

forming a set of data points, wherein each data point in the set of data points comprises a time and a delay measurement for the respective time;

finding a convex hull of the set of data points, wherein the convex hull is bounded by a number of line segments;

selecting a one of the line segments that optimizes an objective function;

extrapolating the one of the line segments to obtain an affine function; and

removing the effect of clock skew between the two data processing systems as characterized by the affine function,

wherein the one of the line segments is selected so that the area between a plot of a piecewise-linear function containing the set of data points and a line containing the one of the line segments will be minimized.

A prior art reference anticipates a claimed invention under 35 U.S.C. § 102 only if every element of the claimed invention is identically shown in that single prior art reference, arranged as they are in the claims. *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). All limitations of a claimed invention must be considered when determining patentability. *In re Lowry*, 32 F.3d 1579, 1582, 32 U.S.P.Q.2d 1031, 1034 (Fed. Cir. 1994). Anticipation focuses on whether a claim reads on the product or process a prior art reference discloses, not on what the reference broadly teaches. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 218 U.S.P.Q. 781 (Fed. Cir. 1983).

Applicants respectfully submits that Skelly does not identically show every element of the claimed invention arranged as they are in claim 1; and, accordingly, does not anticipate claim 1. In particular, Skelly does not teach or suggest "wherein the one of the line segments is selected so that the area between a plot of a piecewise-linear function containing the set of data points and a line containing the one of the line segments will be minimized" as recited in claim 1.

Col. 10, line 64 to Col. 11, line 20 of Skelly, referred to by the Examiner as teaching this feature reads as follows:

The step of fitting a line at the step 220 may be accomplished by minimizing the vertical distance between the line and all delay measurements according to the following formula:

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$$\min \left\{ \sum_{i=1}^N \left(d_i - (\alpha - 1)n_i^* + \beta \right) \right\}.$$

The minimizing condition is used to obtain the solution of the estimates of the ratio of the frequency between the two clocks and the end-to-end delay of the first transmission, consistent with the receiver clock. The estimated end-to-end delay of \bar{d}_1 , calculated as

$$\left(\bar{d}_1 - (\alpha - 1)n_1^* + \beta \right)$$

once α and β are obtained, will be greater than zero, instead of being greater than $\min_i \bar{d}_i$. Thus, β is actually an estimate of $(\bar{d}_1 + \min_i \bar{d}_i)$. The resulting delay of $\bar{d}_1 - (\alpha - 1)n_1^* + \beta$ is not the end-to-end delay, but rather the variable portion of end-to-end delay.

In addition, Col. 16, lines 54-67 of Skelly also referred to by the Examiner is as follows:

FIG. 1 illustrates a trace where the skew between two clocks was nearly constant over the measurement duration. Looking at the figure, one is tempted to pick up a ruler, draw a line that skims through the bottom of the mass of the scatter-plot, measure the angle between the line and the x-axis, and calculate the skew using simple trigonometry. This approach is hard to automate, and invites human errors that are untraceable. A second thought would be to pick the first and last data points, and draw a line between them. The accuracy of this approach, however, can be easily thrown off, since delay has formidable variability that is in the order of magnitude bigger than the skew all through the measurement duration. Our approach is to fit a line that lies under all the data points, but as closely to them as possible.

The above recitations nowhere state or suggest "wherein the one of the line segments is selected so that the area between a plot of a piecewise-linear function containing the set of data points and a line containing the one of the line segments will be minimized" as now recited in claim 1.

Skelly describes an algorithm for estimating and removing clock skew between two clocks on a network which involves fitting a line that lies under all data points, but as closely to the data points as possible (see, for example, col. 8, lines 51-53 of Skelly). In

the present invention, on the other hand, the effect of clock skew between data processing systems connected by a network is removed in a different manner. In particular, in the present invention, as now recited in claim 1, a technique is used in which a line segment is selected "so that the area between a plot of a piecewise-linear function containing the set of data points and a line containing the one of the line segments will be minimized" (Emphasis added). As pointed out in the present specification, for example, at page 11, lines 6-14, although the sum of the vertical distances between the data points and an affine function line is one possible objective function, another objective function "is the area between the 'curve' formed by the data points and the affine function". Skelly nowhere discloses or suggests an algorithm by which a line segment is selected "so that the area between a plot of a piecewise-linear function containing the set of data points and a line containing the one of the line segments will be minimized", and, accordingly, does not anticipate claim 1. Claim 1, therefore, is believed to be allowable over Skelly in its present form, and it is respectfully requested that the Examiner so find.

Claims 7-9 depend from and further restrict claim 1, and are also not anticipated by Skelly, at least by virtue of their dependency, and claims 2 and 3 have been canceled to expedite prosecution.

Independent claim 10 has been amended in a similar manner as claim 1 to incorporate the subject matter of canceled claim 14, and should be allowable in its present form for substantially the same reasons as discussed above with respect to claim 1. Claims 16-18 depend from and further restrict claim 10 and should be allowable in their present form, at least by virtue of their dependency. Claims 11 and 12 have been canceled to expedite prosecution.

Therefore, the rejection of claims 1-3, 5, 7-12, 14 and 16-18 under 35 U.S.C. § 102 has been overcome.

Furthermore, Skelly does not teach, suggest, or give any incentive to make the needed changes to reach the presently claimed invention. As indicated above, Skelly estimates clock skew in a manner that is quite different from the present invention, and, therefore, actually teaches away from the presently claimed invention. Absent the Examiner pointing out some teaching or incentive to implement Skelly to remove clock skew using the technique now recited in independent claims 1 and 10, one of ordinary

skill in the art would not be led to modify Skelly to reach the present invention when the reference is examined as a whole. Absent some teaching, suggestion, or incentive to modify Skelly in this manner, the presently claimed invention can be reached only through an improper use of hindsight using the Applicants' disclosure as a template to make the necessary changes to reach the claimed invention.

II. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claims 19-21, 23 and 25-27 under 35 U.S.C. § 103 as being unpatentable over Skelly in view of Forbes (U.S. Patent No. 6,539,490). This rejection is respectfully traversed.

In rejecting the claims, the Examiner acknowledges that Skelly does not disclose a particular interconnection of the components in the data processing system; and cites Forbes as disclosing this feature.

Independent claim 19, however, has been amended in a similar manner as claim 1 to incorporate the subject matter of canceled claim 23. Forbes does not supply the deficiencies in Skelly as discussed above, and, accordingly, claim 019 is patentable over Skelly in view of Forbes for substantially the same reasons as discussed above with respect to claim 1.

Claims 25-27 depend from and further restrict claim 19 and should be allowable in their present form, at least by virtue of their dependency. In addition, claims 20 and 21 have been canceled to expedite prosecution.

Therefore, the rejection of claims 19-21, 23 and 25-27 under 35 U.S.C. § 103 has been overcome.

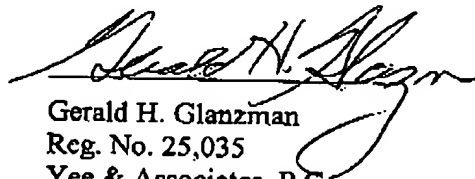
III. Conclusion

It is respectfully urged that the subject application is patentable over the cited references and is now in condition for allowance. It is also submitted that this Response raises no new issues that would require further search and/or consideration by the Examiner, and that entry of the Response as placing the application in condition for allowance is appropriate. In particular, independent claims 1, 10 and 19 were amended to incorporate subject matter previously recited in dependent claims 5, 13 and 23, respectfully, and thus raise no new issues. In addition, new claims 28 and 29 depend from and further restrict allowed claim 4, and, thus, also raise no new issues.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,



Gerald H. Glanzman
Reg. No. 25,035
Yee & Associates, P.C.
P.O. Box 802333
Dallas, TX 75380
(972) 385-8777
Attorney for Applicants